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2D to 3D high-resolution seismic data conversion: imaging a shallow water metal bearing mine tailings deposit in Portmán Bay, Spain

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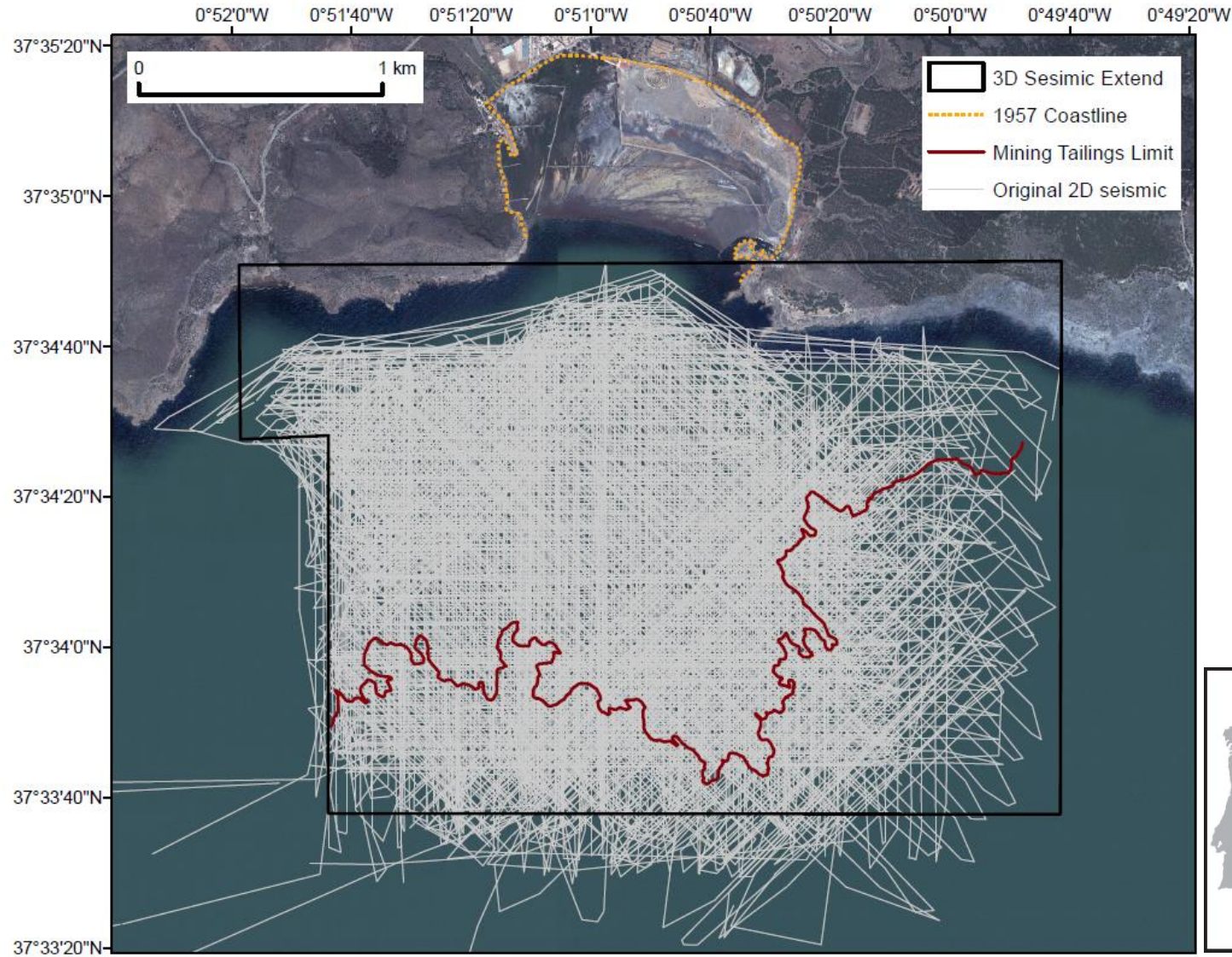
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Portmán Bay dataset



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Method



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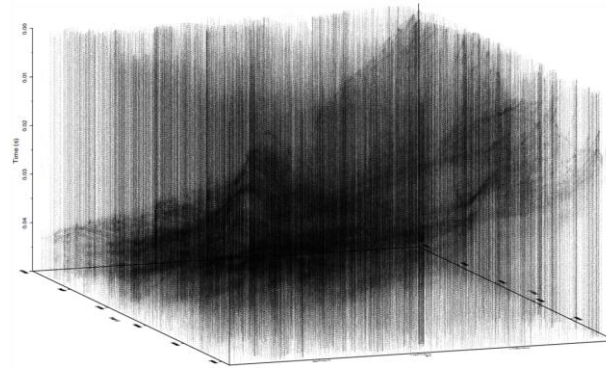
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2D dataset
preparation

- Define TWT interval of interest
- Clean up 2D seismic data set
- Lower digit count
- Standardize sampling rate

X – Y – Z - A
Trace could



3D Conversion

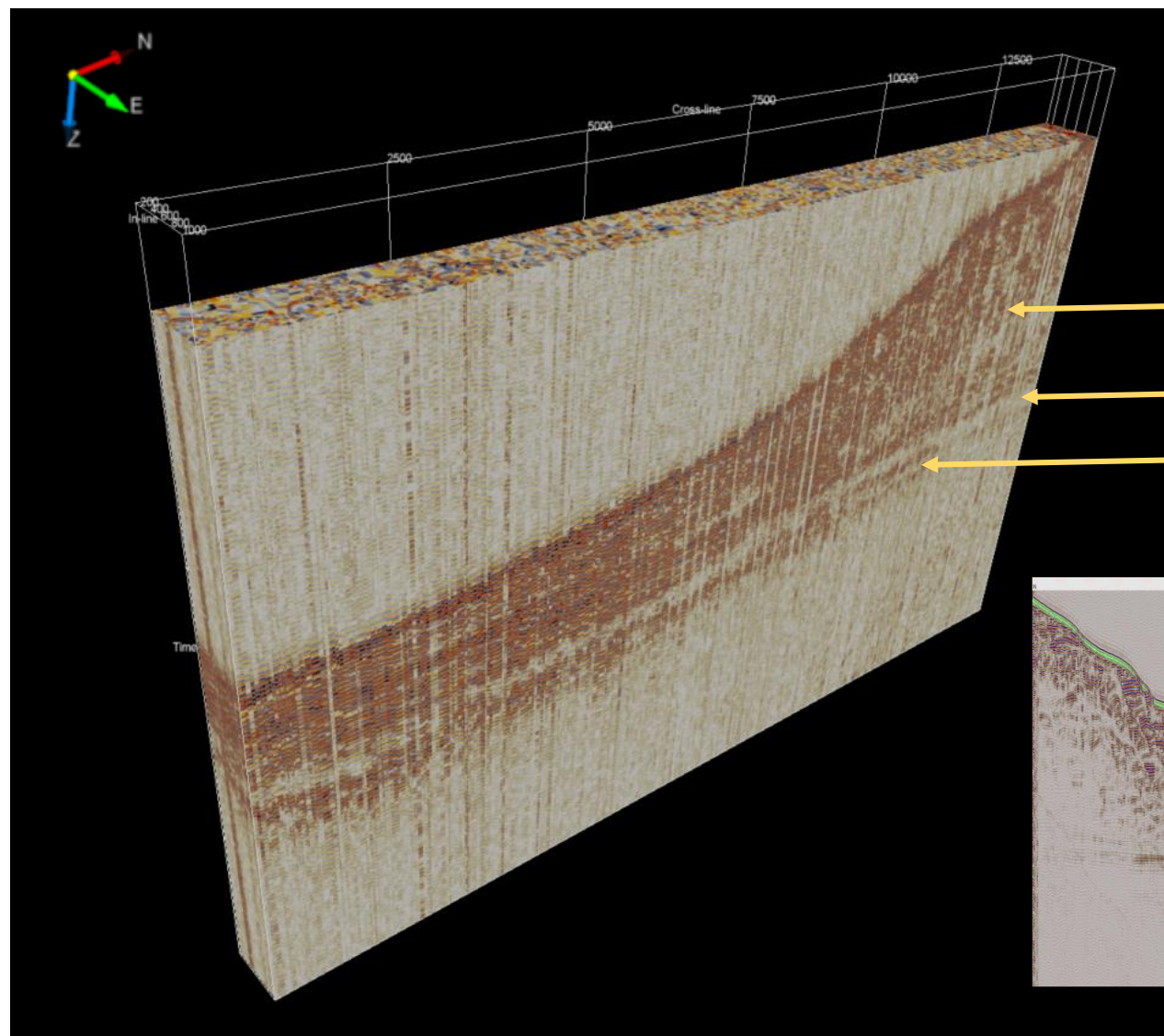
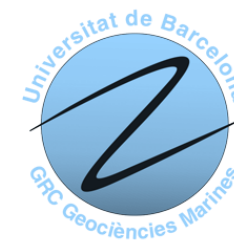
- Build a regular grid
- Identify near neighbors
- Interpolate

Analysis and discussion



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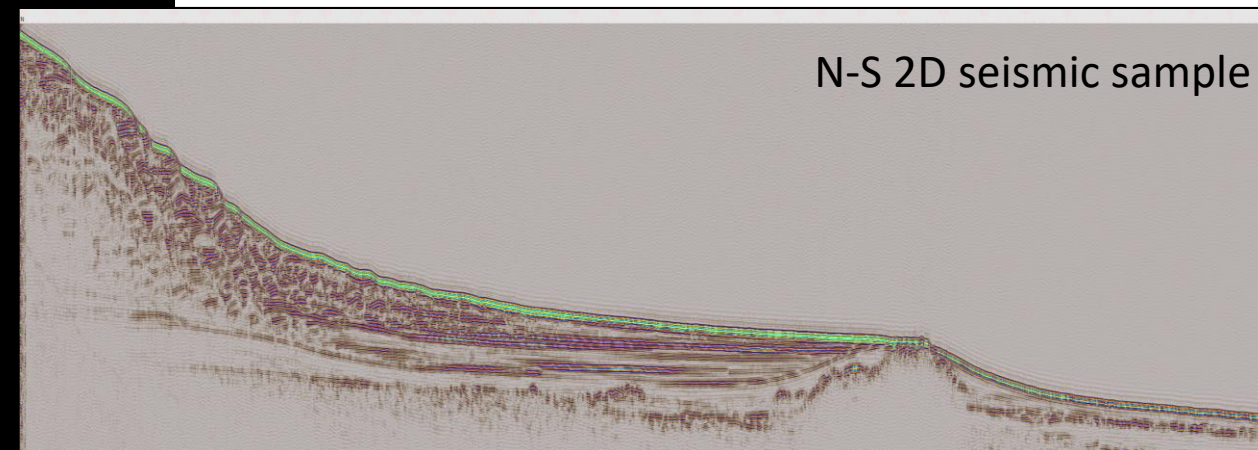
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Mine tailings

Pre-tailings marine deposits

Beachrock





Conclusions and recommendations

- This workflow demonstrates how to **significantly lower the cost of obtaining a 3D seismic cube**.
- The workflow has demonstrated how to achieve **multi-directional visualization** of the mine tailings deposit, as well as **faster characterization** and **more accurate volumetric calculation**.
- Although quality will always be lower than true 3D seismic, in this workflow we have achieved enough **visualization quality** to be able to understand the mine tailings deposit structure in 3D.
- In order to smooth the presented workflow in **future work**, we recommend:
 - Planning a 2D seismic grid as much regular as possible during acquisition.
 - Ensuring standardizing the sampling rate during the 2D seismic grid acquisition.
 - Ensuring no irregular noise interferes seismic acquisition.
 - Applying an advanced 2D seismic clean up before conversion, in order to avoid interpolating noise.
 - Calculating in advance the size of the resulting 3D volume and adequate computational capabilities.